

CLAIMS

1. An injector comprising a rigid tube (1) with an outlet at one end (46) and a non-return valve at the other end (46), a hole in the tube wall (3), an elastomeric liner (7) within the rigid tube (1) and a piston (26) arranged to impact the elastomeric liner (7) through the hole in the tube (3) to produce a high pressure transient.
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2. An injector according to claim 1, including a spring member (20) arranged to act upon the piston (26) to cause the piston to impact the liner (7).
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3. An injector according to claim 1 or 2 wherein the piston (26) is attached to a mass (24) which is capable of being accelerated.
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4. An injector according to claim 3, dependent upon claim 2, wherein the mass (24) can be accelerated by the spring member (20).
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5. An injector according to claims 3 or 4 wherein the spring (20) member is bi-stable.
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6. An injector according to claim 5 wherein the spring member (20) can be manually energised to a latched position and triggered by pressure against the skin of a patient.
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7. An injector according to any of claims 2 to 6, wherein the spring member (20) comprises an arcuate lamina which is deformable by bending to decrease in curvature.

8. An injector according to any of claims 2 to 7 wherein one end of the spring member (21) is pivotable in a transverse channel (4) of the rigid tube (1).
9. An injector according to any of claims 3 to 8 wherein the other end of the spring member (22) is connected to the mass (24).
10. An injector according to any of claims 3 to 8 wherein the mass (24) is triangularly shaped.
- 10 11. An injector according to claim 10, wherein an apex (28) of the triangularly shaped mass is pivotable in a retaining groove (5) of the rigid tube (1).
12. An injector according to any of claims 3 to 7 wherein the mass (24) bears the piston (26) which fits within the hole (3) in the rigid tube for impacting the elastomeric liner (7).
13. An injector according to any preceding claim, wherein the elastomeric liner (7) is oversize or axially compressed to provide a seal within the rigid tube (1).
- 20 14. An injector according to claim 13 wherein the elastomeric liner is axially compressed between a shoulder (2) within the rigid tube (1) and an oversize plug (8) which comprises a channel (11) and is retained by friction therewithin.

15. An injector according to claim 14 wherein the plug (8) is a cylinder comprising one or more flats (9) or a helical groove, such that the fit of the plug within the bore (10) of the tube defines one or more capillary feed channels (11).

5 16. An injector according to claim 15 wherein the walls of the compressed elastomeric liner (7) cover the capillary channels (11) formed by the flats (9) or helical groove, to form a non-return valve biased in the closed position.

10 17. An injector according to any of claims 1 to 13 including an oversize capillary tube (44) which retains or compresses the elastomeric liner (7) and is itself retained by frictional forces.

15 18. An injector according to claim 17, including a blind elastomeric tube (7) with a transversely slot off-axis (42,43) which forms a non-return valve (46) with the retaining capillary tube (44).

19. An injector according to claim 18 wherein a conical cross-section (47) of the blind termination (41) of the elastomeric tube (7) biases the valve into a closed position.

20 20. An injector according to claim 17, 18 or 19 wherein the capillary tube (44) is sharpened to pierce the rubber septum of an ampoule, to provide a supply of liquid drug to the tube.

25 21. An injector according to any preceding claim, wherein the elastomeric liner (7) is made of silicone rubber.

22. An injector according to claim 21 wherein the silicone rubber is filled with a proportion of silicone oil to provide intrinsic lubrication.

5 23. An injector according to any preceding claim, wherein the outlet (15) is a nozzle.

24. An injector according to any preceding claim, wherein the surface surrounding the outlet is saddle-shaped (50).

10 25. An injector according to claim 24, wherein the cross-section of the saddle-shaped outlet (50) is rectangular (56).

26. An injector according to claim 25, wherein the cross-section of the saddle-shaped outlet (56) increases in size with distance from the axis thereof (57).

15 27. An injector according to any preceding claim, including a retractor spring (29) which partially removes the piston (26) from the hole (3) in the rigid tube wall (1), when the injector is in its quiescent state, so that the elastomeric liner (7) does not take a compression set.

20 28. An injector according to claim 27, wherein the retractor spring (29) is low rate and does not retract the piston beyond a given point, such that the elastomeric liner is not extruded through the hole (3) in the rigid tube wall by pressure from an associated injection syringe, in use.